

$k1a\text{RAFK}[t]S[-1,0,0][t] - k1a\text{RAFK}[t]S[-1,1,0][t] -$   
 $k1a\text{RAFK}[t]S[-1,2,0][t] - k1a\text{RAFK}[t]S[0,-1,0][t] -$   
 $k1a\text{RAFK}[t]S[0,0,0][t] - k1a\text{RAFK}[t]S[0,1,0][t] -$   
 $k1a\text{RAFK}[t]S[0,2,0][t] - k1a\text{RAFK}[t]S[1,-1,0][t] -$   
 $k1a\text{RAFK}[t]S[1,0,0][t] - k1a\text{RAFK}[t]S[1,1,0][t] -$   
 $k1a\text{RAFK}[t]S[1,2,0][t] - k1a\text{RAFK}[t]S[2,-1,0][t] -$   
 $k1a\text{RAFK}[t]S[2,0,0][t] - k1a\text{RAFK}[t]S[2,1,0][t] -$   
 $k1a\text{RAFK}[t]S[2,2,0][t] + d1a\text{SHRAFK}[-1,-1,0][t] +$   
 $k1\text{SHRAFK}[-1,-1,0][t] + d1a\text{SHRAFK}[-1,0,0][t] +$   
 $k1\text{SHRAFK}[-1,0,0][t] + d1a\text{SHRAFK}[-1,1,0][t] +$   
 $k1\text{SHRAFK}[-1,1,0][t] + d1a\text{SHRAFK}[-1,2,0][t] +$   
 $k1\text{SHRAFK}[-1,2,0][t] + d1a\text{SHRAFK}[0,-1,0][t] +$   
 $k1\text{SHRAFK}[0,-1,0][t] + d1a\text{SHRAFK}[0,0,0][t] +$   
 $k1\text{SHRAFK}[0,0,0][t] + d1a\text{SHRAFK}[0,1,0][t] +$   
 $k1\text{SHRAFK}[0,1,0][t] + d1a\text{SHRAFK}[0,2,0][t] +$   
 $k1\text{SHRAFK}[0,2,0][t] + d1a\text{SHRAFK}[1,-1,0][t] +$   
 $k1\text{SHRAFK}[1,-1,0][t] + d1a\text{SHRAFK}[1,0,0][t] +$   
 $k1\text{SHRAFK}[1,0,0][t] + d1a\text{SHRAFK}[1,1,0][t] +$   
 $k1\text{SHRAFK}[1,1,0][t] + d1a\text{SHRAFK}[1,2,0][t] +$   
 $k1\text{SHRAFK}[1,2,0][t] + d1a\text{SHRAFK}[2,-1,0][t] +$   
 $k1\text{SHRAFK}[2,-1,0][t] + d1a\text{SHRAFK}[2,0,0][t] +$   
 $k1\text{SHRAFK}[2,0,0][t] + d1a\text{SHRAFK}[2,1,0][t] +$   
 $k1\text{SHRAFK}[2,1,0][t] + d1a\text{SHRAFK}[2,2,0][t] + k1\text{SHRAFK}[2,2,0][t],$   
 $\text{RAFP}[t] == -a2\text{RAFP}[t]K[3,1][t] + d2\text{KSHRAPF}[3,1][t] +$   
 $k2\text{KSHRAPF}[3,1][t], K[1,0][t] ==$   
 $-a7K[1,0][t]K[2,2][t] + d7\text{KHK}[1,0,2,2][t] + k8\text{KHMAPKP}[1,1][t] -$   
 $\text{kon}K[1,0][t]S[-1,-1,-1][t] - \text{kon}K[1,0][t]S[-1,-1,0][t] -$   
 $\text{kon}K[1,0][t]S[-1,-1,1][t] - \text{kon}K[1,0][t]S[-1,0,-1][t] -$   
 $\text{kon}K[1,0][t]S[-1,0,0][t] - \text{kon}K[1,0][t]S[-1,0,1][t] -$   
 $\text{kon}K[1,0][t]S[-1,1,-1][t] - \text{kon}K[1,0][t]S[-1,1,0][t] -$   
 $\text{kon}K[1,0][t]S[-1,1,1][t] - \text{kon}K[1,0][t]S[-1,2,-1][t] -$   
 $\text{kon}K[1,0][t]S[-1,2,0][t] - \text{kon}K[1,0][t]S[-1,2,1][t] +$   
 $\text{koff}S[0,-1,-1][t] + \text{koff}S[0,-1,0][t] + \text{koff}S[0,-1,1][t] +$   
 $\text{koff}S[0,0,-1][t] + \text{koff}S[0,0,0][t] + \text{koff}S[0,0,1][t] +$   
 $\text{koff}S[0,1,-1][t] + \text{koff}S[0,1,0][t] + \text{koff}S[0,1,1][t] +$   
 $\text{koff}S[0,2,-1][t] + \text{koff}S[0,2,0][t] + \text{koff}S[0,2,1][t],$   
 $K[1,1][t] == -a8\text{MAPKP}[t]K[1,1][t] - a9K[1,1][t]K[2,2][t] +$   
 $k7\text{KHK}[1,0,2,2][t] + d9\text{KHK}[1,1,2,2][t] + d8\text{KHMAPKP}[1,1][t] +$   
 $k10\text{KHMAPKP}[1,2][t] - \text{kpon}K[1,1][t]S[-1,-1,-1][t] -$   
 $\text{kpon}K[1,1][t]S[-1,-1,0][t] - \text{kpon}K[1,1][t]S[-1,-1,1][t] -$   
 $\text{kpon}K[1,1][t]S[-1,0,-1][t] - \text{kpon}K[1,1][t]S[-1,0,0][t] -$   
 $\text{kpon}K[1,1][t]S[-1,0,1][t] - \text{kpon}K[1,1][t]S[-1,1,-1][t] -$   
 $\text{kpon}K[1,1][t]S[-1,1,0][t] - \text{kpon}K[1,1][t]S[-1,1,1][t] -$   
 $\text{kpon}K[1,1][t]S[-1,2,-1][t] - \text{kpon}K[1,1][t]S[-1,2,0][t] -$   
 $\text{kpon}K[1,1][t]S[-1,2,1][t] + \text{kpoff}S[1,-1,-1][t] +$   
 $\text{kpoff}S[1,-1,0][t] + \text{kpoff}S[1,-1,1][t] +$   
 $\text{kpoff}S[1,0,-1][t] + \text{kpoff}S[1,0,0][t] + \text{kpoff}S[1,0,1][t] +$   
 $\text{kpoff}S[1,1,-1][t] + \text{kpoff}S[1,1,0][t] + \text{kpoff}S[1,1,1][t] +$   
 $\text{kpoff}S[1,2,-1][t] + \text{kpoff}S[1,2,0][t] + \text{kpoff}S[1,2,1][t],$   
 $K[1,2][t] == -a10\text{MAPKP}[t]K[1,2][t] + k9\text{KHK}[1,1,2,2][t] +$   
 $d10\text{KHMAPKP}[1,2][t] - \text{kpon}K[1,2][t]S[-1,-1,-1][t] -$   
 $\text{kpon}K[1,2][t]S[-1,-1,0][t] - \text{kpon}K[1,2][t]S[-1,-1,1][t] -$

FIG. 18 (Page 2 of 10)

$$\begin{aligned}
& \text{kpon } K[1, 2][t] S[-1, 0, -1][t] - \text{kpon } K[1, 2][t] S[-1, 0, 0][t] - \\
& \text{kpon } K[1, 2][t] S[-1, 0, 1][t] - \text{kpon } K[1, 2][t] S[-1, 1, -1][t] - \\
& \text{kpon } K[1, 2][t] S[-1, 1, 0][t] - \text{kpon } K[1, 2][t] S[-1, 1, 1][t] - \\
& \text{kpon } K[1, 2][t] S[-1, 2, -1][t] - \text{kpon } K[1, 2][t] S[-1, 2, 0][t] - \\
& \text{kpon } K[1, 2][t] S[-1, 2, 1][t] + \text{kpoff } S[2, -1, -1][t] + \\
& \text{kpoff } S[2, -1, 0][t] + \text{kpoff } S[2, -1, 1][t] + \\
& \text{kpoff } S[2, 0, -1][t] + \text{kpoff } S[2, 0, 0][t] + \text{kpoff } S[2, 0, 1][t] + \\
& \text{kpoff } S[2, 1, -1][t] + \text{kpoff } S[2, 1, 0][t] + \text{kpoff } S[2, 1, 1][t] + \\
& \text{kpoff } S[2, 2, -1][t] + \text{kpoff } S[2, 2, 0][t] + \text{kpoff } S[2, 2, 1][t], \\
& K[2, 0][t] = -a3 K[2, 0][t] K[3, 1][t] + d3 K[K[2, 0, 3, 1][t] + \\
& k4 K[MEKP[2, 1][t] - \text{kon } K[2, 0][t] S[-1, -1, -1][t] - \\
& \text{kon } K[2, 0][t] S[-1, -1, 0][t] - \text{kon } K[2, 0][t] S[-1, -1, 1][t] + \\
& \text{koff } S[-1, 0, -1][t] + \text{koff } S[-1, 0, 0][t] + \\
& \text{koff } S[-1, 0, 1][t] - \text{kon } K[2, 0][t] S[0, -1, -1][t] - \\
& \text{kon } K[2, 0][t] S[0, -1, 0][t] - \text{kon } K[2, 0][t] S[0, -1, 1][t] + \\
& \text{koff } S[0, 0, -1][t] + \text{koff } S[0, 0, 0][t] + \\
& \text{koff } S[0, 0, 1][t] - \text{kon } K[2, 0][t] S[1, -1, -1][t] - \\
& \text{kon } K[2, 0][t] S[1, -1, 0][t] - \text{kon } K[2, 0][t] S[1, -1, 1][t] + \\
& \text{koff } S[1, 0, -1][t] + \text{koff } S[1, 0, 0][t] + \\
& \text{koff } S[1, 0, 1][t] - \text{kon } K[2, 0][t] S[2, -1, -1][t] - \\
& \text{kon } K[2, 0][t] S[2, -1, 0][t] - \text{kon } K[2, 0][t] S[2, -1, 1][t] + \\
& \text{koff } S[2, 0, -1][t] + \text{koff } S[2, 0, 0][t] + \text{koff } S[2, 0, 1][t], \\
& K[2, 1][t] = -a4 MEKP[t] K[2, 1][t] - a5 K[2, 1][t] K[3, 1][t] + \\
& k3 K[K[2, 0, 3, 1][t] + d5 K[K[2, 1, 3, 1][t] + d4 K[MEKP[2, 1][t] + \\
& k6 K[MEKP[2, 2][t] - \text{kpon } K[2, 1][t] S[-1, -1, -1][t] - \\
& \text{kpon } K[2, 1][t] S[-1, -1, 0][t] - \text{kpon } K[2, 1][t] S[-1, -1, 1][t] + \\
& \text{kpoff } S[-1, 1, -1][t] + \text{kpoff } S[-1, 1, 0][t] + \\
& \text{kpoff } S[-1, 1, 1][t] - \text{kpon } K[2, 1][t] S[0, -1, -1][t] - \\
& \text{kpon } K[2, 1][t] S[0, -1, 0][t] - \text{kpon } K[2, 1][t] S[0, -1, 1][t] + \\
& \text{kpoff } S[0, 1, -1][t] + \text{kpoff } S[0, 1, 0][t] + \\
& \text{kpoff } S[0, 1, 1][t] - \text{kpon } K[2, 1][t] S[1, -1, -1][t] - \\
& \text{kpon } K[2, 1][t] S[1, -1, 0][t] - \text{kpon } K[2, 1][t] S[1, -1, 1][t] + \\
& \text{kpoff } S[1, 1, -1][t] + \text{kpoff } S[1, 1, 0][t] + \\
& \text{kpoff } S[1, 1, 1][t] - \text{kpon } K[2, 1][t] S[2, -1, -1][t] - \\
& \text{kpon } K[2, 1][t] S[2, -1, 0][t] - \text{kpon } K[2, 1][t] S[2, -1, 1][t] + \\
& \text{kpoff } S[2, 1, -1][t] + \text{kpoff } S[2, 1, 0][t] + \text{kpoff } S[2, 1, 1][t], \\
& K[2, 2][t] = -a6 MEKP[t] K[2, 2][t] - a7 K[1, 0][t] K[2, 2][t] - \\
& a9 K[1, 1][t] K[2, 2][t] + d7 K[K[1, 0, 2, 2][t] + \\
& k7 K[K[1, 0, 2, 2][t] + d9 K[K[1, 1, 2, 2][t] + \\
& k9 K[K[1, 1, 2, 2][t] + k5 K[K[2, 1, 3, 1][t] + \\
& d6 K[MEKP[2, 2][t] - \text{kpon } K[2, 2][t] S[-1, -1, -1][t] - \\
& \text{kpon } K[2, 2][t] S[-1, -1, 0][t] - \text{kpon } K[2, 2][t] S[-1, -1, 1][t] + \\
& \text{kpoff } S[-1, 2, -1][t] + \text{kpoff } S[-1, 2, 0][t] + \\
& \text{kpoff } S[-1, 2, 1][t] - \text{kpon } K[2, 2][t] S[0, -1, -1][t] - \\
& \text{kpon } K[2, 2][t] S[0, -1, 0][t] - \text{kpon } K[2, 2][t] S[0, -1, 1][t] + \\
& \text{kpoff } S[0, 2, -1][t] + \text{kpoff } S[0, 2, 0][t] + \\
& \text{kpoff } S[0, 2, 1][t] - \text{kpon } K[2, 2][t] S[1, -1, -1][t] - \\
& \text{kpon } K[2, 2][t] S[1, -1, 0][t] - \text{kpon } K[2, 2][t] S[1, -1, 1][t] + \\
& \text{kpoff } S[1, 2, -1][t] + \text{kpoff } S[1, 2, 0][t] + \\
& \text{kpoff } S[1, 2, 1][t] - \text{kpon } K[2, 2][t] S[2, -1, -1][t] - \\
& \text{kpon } K[2, 2][t] S[2, -1, 0][t] - \text{kpon } K[2, 2][t] S[2, -1, 1][t] + \\
& \text{kpoff } S[2, 2, -1][t] + \text{kpoff } S[2, 2, 0][t] + \text{kpoff } S[2, 2, 1][t],
\end{aligned}$$

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$$\begin{aligned}
K[3, 0]'[t] = & -a1 \text{RAFK}[t] K[3, 0][t] - d1 K \text{HRAFK}[3, 0][t] + \\
& k2 K \text{HRAFP}[3, 1][t] - kon K[3, 0][t] S[-1, -1, -1][t] + \\
& koff S[-1, -1, 0][t] - kon K[3, 0][t] S[-1, 0, -1][t] + \\
& koff S[-1, 0, 0][t] - kon K[3, 0][t] S[-1, 1, -1][t] + \\
& koff S[-1, 1, 0][t] - kon K[3, 0][t] S[-1, 2, -1][t] + \\
& koff S[-1, 2, 0][t] - kon K[3, 0][t] S[0, -1, -1][t] + \\
& koff S[0, -1, 0][t] - kon K[3, 0][t] S[0, 0, -1][t] + \\
& koff S[0, 0, 0][t] - kon K[3, 0][t] S[0, 1, -1][t] + \\
& koff S[0, 1, 0][t] - kon K[3, 0][t] S[0, 2, -1][t] + \\
& koff S[0, 2, 0][t] - kon K[3, 0][t] S[1, -1, -1][t] + \\
& koff S[1, -1, 0][t] - kon K[3, 0][t] S[1, 0, -1][t] + \\
& koff S[1, 0, 0][t] - kon K[3, 0][t] S[1, 1, -1][t] + \\
& koff S[1, 1, 0][t] - kon K[3, 0][t] S[1, 2, -1][t] + \\
& koff S[1, 2, 0][t] - kon K[3, 0][t] S[2, -1, -1][t] + \\
& koff S[2, -1, 0][t] - kon K[3, 0][t] S[2, 0, -1][t] + \\
& koff S[2, 0, 0][t] - kon K[3, 0][t] S[2, 1, -1][t] + \\
& koff S[2, 1, 0][t] - kon K[3, 0][t] S[2, 2, -1][t] + koff S[2, 2, 0][t], \\
K[3, 1]'[t] = & -a2 \text{RAFP}[t] K[3, 1][t] - a3 K[2, 0][t] K[3, 1][t] - \\
& a5 K[2, 1][t] K[3, 1][t] + d3 K \text{H}K[2, 0, 3, 1][t] + \\
& k3 K \text{H}K[2, 0, 3, 1][t] + d5 K \text{H}K[2, 1, 3, 1][t] + \\
& k5 K \text{H}K[2, 1, 3, 1][t] + k1 K \text{HRAFK}[3, 0][t] + d2 K \text{HRAFP}[3, 1][t] - \\
& kpon K[3, 1][t] S[-1, -1, -1][t] + kpo S[-1, -1, 1][t] - \\
& kpon K[3, 1][t] S[-1, 0, -1][t] + kpo S[-1, 0, 1][t] - \\
& kpon K[3, 1][t] S[-1, 1, -1][t] + kpo S[-1, 1, 1][t] - \\
& kpon K[3, 1][t] S[-1, 2, -1][t] + kpo S[-1, 2, 1][t] - \\
& kpon K[3, 1][t] S[0, -1, -1][t] + kpo S[0, -1, 1][t] - \\
& kpon K[3, 1][t] S[0, 0, -1][t] + kpo S[0, 0, 1][t] - \\
& kpon K[3, 1][t] S[0, 1, -1][t] + kpo S[0, 1, 1][t] - \\
& kpon K[3, 1][t] S[0, 2, -1][t] + kpo S[0, 2, 1][t] - \\
& kpon K[3, 1][t] S[1, -1, -1][t] + kpo S[1, -1, 1][t] - \\
& kpon K[3, 1][t] S[1, 0, -1][t] + kpo S[1, 0, 1][t] - \\
& kpon K[3, 1][t] S[1, 1, -1][t] + kpo S[1, 1, 1][t] - \\
& kpon K[3, 1][t] S[1, 2, -1][t] + kpo S[1, 2, 1][t] - \\
& kpon K[3, 1][t] S[2, -1, -1][t] + kpo S[2, -1, 1][t] - \\
& kpon K[3, 1][t] S[2, 0, -1][t] + kpo S[2, 0, 1][t] - \\
& kpon K[3, 1][t] S[2, 1, -1][t] + kpo S[2, 1, 1][t] - \\
& kpon K[3, 1][t] S[2, 2, -1][t] + kpo S[2, 2, 1][t], \\
K \text{H}K[1, 0, 2, 2]'[t] = & a7 K[1, 0][t] K[2, 2][t] - \\
& d7 K \text{H}K[1, 0, 2, 2][t] - k7 K \text{H}K[1, 0, 2, 2][t], \\
K \text{H}K[1, 1, 2, 2]'[t] = & a9 K[1, 1][t] K[2, 2][t] - \\
& d9 K \text{H}K[1, 1, 2, 2][t] - k9 K \text{H}K[1, 1, 2, 2][t], \\
K \text{H}K[2, 0, 3, 1]'[t] = & a3 K[2, 0][t] K[3, 1][t] - \\
& d3 K \text{H}K[2, 0, 3, 1][t] - k3 K \text{H}K[2, 0, 3, 1][t], \\
K \text{H}K[2, 1, 3, 1]'[t] = & a5 K[2, 1][t] K[3, 1][t] - d5 K \text{H}K[2, 1, 3, 1][t] - \\
& k5 K \text{H}K[2, 1, 3, 1][t], K \text{HMAPKP}[1, 1]'[t] = \\
& a8 \text{MAPKP}[t] K[1, 1][t] - d8 K \text{HMAPKP}[1, 1][t] - k8 K \text{HMAPKP}[1, 1][t], \\
K \text{HMAPKP}[1, 2]'[t] = & a10 \text{MAPKP}[t] K[1, 2][t] - \\
& d10 K \text{HMAPKP}[1, 2][t] - k10 K \text{HMAPKP}[1, 2][t], \\
K \text{HMEKP}[2, 1]'[t] = & a4 \text{MEKP}[t] K[2, 1][t] - d4 K \text{HMEKP}[2, 1][t] - \\
& k4 K \text{HMEKP}[2, 1][t], K \text{HMEKP}[2, 2]'[t] = \\
& a6 \text{MEKP}[t] K[2, 2][t] - d6 K \text{HMEKP}[2, 2][t] - k6 K \text{HMEKP}[2, 2][t], \\
K \text{HRAFK}[3, 0]'[t] = & a1 \text{RAFK}[t] K[3, 0][t] - d1 K \text{HRAFK}[3, 0][t]
\end{aligned}$$

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kl SHRAFK[0, 0, 0][t], S[0, 1, -1][t] ==
konK[1, 0][t] S[-1, 1, -1][t] + kponK[2, 1][t] S[0, -1, -1][t] -
koffS[0, 1, -1][t] - kpoffS[0, 1, -1][t] -
konK[3, 0][t] S[0, 1, -1][t] - kponK[3, 1][t] S[0, 1, -1][t] +
koffS[0, 1, 0][t] + kpoffS[0, 1, 1][t],
S[0, 1, 0][t] == konK[1, 0][t] S[-1, 1, 0][t] +
kponK[2, 1][t] S[0, -1, 0][t] + konK[3, 0][t] S[0, 1, -1][t] -
2koffS[0, 1, 0][t] - kpoffS[0, 1, 0][t] -
klaRAFK[t] S[0, 1, 0][t] + dlaSHRAFK[0, 1, 0][t],
S[0, 1, 1][t] == konK[1, 0][t] S[-1, 1, 1][t] +
kponK[2, 1][t] S[0, -1, 1][t] + k3S[0, 0, 1][t] +
kponK[3, 1][t] S[0, 1, -1][t] - k5aS[0, 1, 1][t] -
koffS[0, 1, 1][t] - 2kpoffS[0, 1, 1][t] + kl SHRAFK[0, 1, 0][t],
S[0, 2, -1][t] == konK[1, 0][t] S[-1, 2, -1][t] +
kponK[2, 2][t] S[0, -1, -1][t] - k7S[0, 2, -1][t] -
koffS[0, 2, -1][t] - kpoffS[0, 2, -1][t] -
konK[3, 0][t] S[0, 2, -1][t] - kponK[3, 1][t] S[0, 2, -1][t] +
koffS[0, 2, 0][t] + kpoffS[0, 2, 1][t],
S[0, 2, 0][t] == konK[1, 0][t] S[-1, 2, 0][t] +
kponK[2, 2][t] S[0, -1, 0][t] + konK[3, 0][t] S[0, 2, -1][t] -
k7S[0, 2, 0][t] - 2koffS[0, 2, 0][t] - kpoffS[0, 2, 0][t] -
klaRAFK[t] S[0, 2, 0][t] + dlaSHRAFK[0, 2, 0][t],
S[0, 2, 1][t] == konK[1, 0][t] S[-1, 2, 1][t] +
kponK[2, 2][t] S[0, -1, 1][t] + k5aS[0, 1, 1][t] +
kponK[3, 1][t] S[0, 2, -1][t] - k7S[0, 2, 1][t] -
koffS[0, 2, 1][t] - 2kpoffS[0, 2, 1][t] + kl SHRAFK[0, 2, 0][t],
S[1, -1, -1][t] == kponK[1, 1][t] S[-1, -1, -1][t] -
kpoffS[1, -1, -1][t] - konK[2, 0][t] S[1, -1, -1][t] -
kponK[2, 1][t] S[1, -1, -1][t] - kponK[2, 2][t] S[1, -1, -1][t] -
konK[3, 0][t] S[1, -1, -1][t] - kponK[3, 1][t] S[1, -1, -1][t] +
koffS[1, -1, 0][t] + kpoffS[1, -1, 1][t] + koffS[1, 0, -1][t] +
kpoffS[1, 1, -1][t] + kpoffS[1, 2, -1][t],
S[1, -1, 0][t] == kponK[1, 1][t] S[-1, -1, 0][t] +
konK[3, 0][t] S[1, -1, -1][t] - koffS[1, -1, 0][t] -
kpoffS[1, -1, 0][t] - klaRAFK[t] S[1, -1, 0][t] -
konK[2, 0][t] S[1, -1, 0][t] - kponK[2, 1][t] S[1, -1, 0][t] -
kponK[2, 2][t] S[1, -1, 0][t] + koffS[1, 0, 0][t] +
kpoffS[1, 1, 0][t] + kpoffS[1, 2, 0][t] + dlaSHRAFK[1, -1, 0][t],
S[1, -1, 1][t] == kponK[1, 1][t] S[-1, -1, 1][t] +
kponK[3, 1][t] S[1, -1, -1][t] - 2kpoffS[1, -1, 1][t] -
konK[2, 0][t] S[1, -1, 1][t] - kponK[2, 1][t] S[1, -1, 1][t] -
kponK[2, 2][t] S[1, -1, 1][t] + koffS[1, 0, 1][t] +
kpoffS[1, 1, 1][t] + kpoffS[1, 2, 1][t] + kl SHRAFK[1, -1, 0][t],
S[1, 0, -1][t] == kponK[1, 1][t] S[-1, 0, -1][t] +
konK[2, 0][t] S[1, -1, -1][t] - koffS[1, 0, -1][t] -
kpoffS[1, 0, -1][t] - konK[3, 0][t] S[1, 0, -1][t] - kponK[3, 1][t]
S[1, 0, -1][t] + koffS[1, 0, 0][t] + kpoffS[1, 0, 1][t],
S[1, 0, 0][t] == kponK[1, 1][t] S[-1, 0, 0][t] +
konK[2, 0][t] S[1, -1, 0][t] + konK[3, 0][t] S[1, 0, -1][t] -
2koffS[1, 0, 0][t] - kpoffS[1, 0, 0][t] -
klaRAFK[t] S[1, 0, 0][t] + dlaSHRAFK[1, 0, 0][t], S[1, 0, 1][t] ==
kponK[1, 1][t] S[-1, 0, 1][t] + konK[2, 0][t] S[1, -1, 1][t] +

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$$\begin{aligned}
& \text{kpon K}[3, 1][t] \text{S}[1, 0, -1][t] - \text{k3S}[1, 0, 1][t] \\
& \text{koff S}[1, 0, 1][t] - 2 \text{kpoff S}[1, 0, 1][t] + \text{kl S}[1, \text{RAFK}[1, 0, 0][t], \\
& \text{S}[1, 1, -1][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 1, -1][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[1, -1, -1][t] - 2 \text{kpoff S}[1, 1, -1][t] - \\
& \text{kon K}[3, 0][t] \text{S}[1, 1, -1][t] - \text{kpon K}[3, 1][t] \text{S}[1, 1, -1][t] + \\
& \text{koff S}[1, 1, 0][t] + \text{kpoff S}[1, 1, 1][t], \\
& \text{S}[1, 1, 0][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 1, 0][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[1, -1, 0][t] + \text{kon K}[3, 0][t] \text{S}[1, 1, -1][t] - \\
& \text{koff S}[1, 1, 0][t] - 2 \text{kpoff S}[1, 1, 0][t] \\
& \text{kl a RAFK}[t] \text{S}[1, 1, 0][t] + \text{dl a S}[1, \text{RAFK}[1, 1, 0][t], \\
& \text{S}[1, 1, 1][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 1, 1][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[1, -1, 1][t] + \text{k3S}[1, 0, 1][t] + \\
& \text{kpon K}[3, 1][t] \text{S}[1, 1, -1][t] - \text{k5a S}[1, 1, 1][t] - \\
& 3 \text{kpoff S}[1, 1, 1][t] + \text{kl S}[1, \text{RAFK}[1, 1, 0][t], \\
& \text{S}[1, 2, -1][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 2, -1][t] + \\
& \text{k7S}[0, 2, -1][t] + \text{kpon K}[2, 2][t] \text{S}[1, -1, -1][t] - \\
& \text{k9a S}[1, 2, -1][t] - 2 \text{kpoff S}[1, 2, -1][t] - \\
& \text{kon K}[3, 0][t] \text{S}[1, 2, -1][t] - \text{kpon K}[3, 1][t] \text{S}[1, 2, -1][t] + \\
& \text{koff S}[1, 2, 0][t] + \text{kpoff S}[1, 2, 1][t], \\
& \text{S}[1, 2, 0][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 2, 0][t] + \text{k7S}[0, 2, 0][t] + \\
& \text{kpon K}[2, 2][t] \text{S}[1, -1, 0][t] + \text{kon K}[3, 0][t] \text{S}[1, 2, -1][t] - \\
& \text{k9a S}[1, 2, 0][t] - \text{koff S}[1, 2, 0][t] - 2 \text{kpoff S}[1, 2, 0][t] - \\
& \text{kl a RAFK}[t] \text{S}[1, 2, 0][t] + \text{dl a S}[1, \text{RAFK}[1, 2, 0][t], \\
& \text{S}[1, 2, 1][t] == \text{kpon K}[1, 1][t] \text{S}[-1, 2, 1][t] + \text{k7S}[0, 2, 1][t] + \\
& \text{kpon K}[2, 2][t] \text{S}[1, -1, 1][t] + \text{k5a S}[1, 1, 1][t] + \\
& \text{kpon K}[3, 1][t] \text{S}[1, 2, -1][t] - \text{k9a S}[1, 2, 1][t] - \\
& 3 \text{kpoff S}[1, 2, 1][t] + \text{kl S}[1, \text{RAFK}[1, 2, 0][t], \\
& \text{S}[2, -1, -1][t] == \text{kpon K}[1, 2][t] \text{S}[-1, -1, -1][t] - \\
& \text{kpoff S}[2, -1, -1][t] - \text{kon K}[2, 0][t] \text{S}[2, -1, -1][t] - \\
& \text{kpon K}[2, 1][t] \text{S}[2, -1, -1][t] - \text{kpon K}[2, 2][t] \text{S}[2, -1, -1][t] - \\
& \text{kon K}[3, 0][t] \text{S}[2, -1, -1][t] - \text{kpon K}[3, 1][t] \text{S}[2, -1, -1][t] + \\
& \text{koff S}[2, -1, 0][t] + \text{kpoff S}[2, -1, 1][t] + \text{koff S}[2, 0, -1][t] + \\
& \text{kpoff S}[2, 1, -1][t] + \text{kpoff S}[2, 2, -1][t], \\
& \text{S}[2, -1, 0][t] == \text{kpon K}[1, 2][t] \text{S}[-1, -1, 0][t] + \\
& \text{kon K}[3, 0][t] \text{S}[2, -1, -1][t] - \text{koff S}[2, -1, 0][t] - \\
& \text{kpoff S}[2, -1, 0][t] - \text{kl a RAFK}[t] \text{S}[2, -1, 0][t] - \\
& \text{kon K}[2, 0][t] \text{S}[2, -1, 0][t] - \text{kpon K}[2, 1][t] \text{S}[2, -1, 0][t] - \\
& \text{kpon K}[2, 2][t] \text{S}[2, -1, 0][t] + \text{koff S}[2, 0, 0][t] + \\
& \text{kpoff S}[2, 1, 0][t] + \text{kpoff S}[2, 2, 0][t] + \text{dl a S}[2, \text{RAFK}[2, -1, 0][t], \\
& \text{S}[2, -1, 1][t] == \text{kpon K}[1, 2][t] \text{S}[-1, -1, 1][t] + \\
& \text{kpon K}[3, 1][t] \text{S}[2, -1, -1][t] - 2 \text{kpoff S}[2, -1, 1][t] - \\
& \text{kon K}[2, 0][t] \text{S}[2, -1, 1][t] - \text{kpon K}[2, 1][t] \text{S}[2, -1, 1][t] - \\
& \text{kpon K}[2, 2][t] \text{S}[2, -1, 1][t] + \text{koff S}[2, 0, 1][t] + \\
& \text{kpoff S}[2, 1, 1][t] + \text{kpoff S}[2, 2, 1][t] + \text{kl S}[2, \text{RAFK}[2, -1, 0][t], \\
& \text{S}[2, 0, -1][t] == \text{kpon K}[1, 2][t] \text{S}[-1, 0, -1][t] + \\
& \text{kon K}[2, 0][t] \text{S}[2, -1, -1][t] - \text{koff S}[2, 0, -1][t] - \\
& \text{kpoff S}[2, 0, -1][t] - \text{kon K}[3, 0][t] \text{S}[2, 0, -1][t] - \text{kpon K}[3, 1][t] \\
& \text{S}[2, 0, -1][t] + \text{koff S}[2, 0, 0][t] + \text{kpoff S}[2, 0, 1][t], \\
& \text{S}[2, 0, 0][t] == \text{kpon K}[1, 2][t] \text{S}[-1, 0, 0][t] + \\
& \text{kon K}[2, 0][t] \text{S}[2, -1, 0][t] + \text{kon K}[3, 0][t] \text{S}[2, 0, -1][t] - \\
& 2 \text{koff S}[2, 0, 0][t] - \text{kpoff S}[2, 0, 0][t] - \\
& \text{kl a RAFK}[t] \text{S}[2, 0, 0][t] + \text{dl a S}[2, \text{RAFK}[2, 0, 0][t] \text{S}[2, 0, 1][t] ==
\end{aligned}$$

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$$\begin{aligned}
& \text{kpon K}[1, 2][t] \text{S}[2, 0, 1][t] + \text{kpon K}[2, 0][t] \text{S}[2, -1, 1][t] + \\
& \text{kpon K}[3, 1][t] \text{S}[2, 0, -1][t] - \text{k3S}[2, 0, 1][t] - \\
& \text{koff S}[2, 0, 1][t] - 2 \text{kpoff S}[2, 0, 1][t] + \text{k1 S}\# \text{RAFK}[2, 0, 0][t], \\
\text{S}[2, 1, -1][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 1, -1][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[2, -1, -1][t] - 2 \text{kpoff S}[2, 1, -1][t] - \\
& \text{kon K}[3, 0][t] \text{S}[2, 1, -1][t] - \text{kpon K}[3, 1][t] \text{S}[2, 1, -1][t] + \\
& \text{koff S}[2, 1, 0][t] + \text{kpoff S}[2, 1, 1][t], \\
\text{S}[2, 1, 0][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 1, 0][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[2, -1, 0][t] + \text{kon K}[3, 0][t] \text{S}[2, 1, -1][t] - \\
& \text{koff S}[2, 1, 0][t] - 2 \text{kpoff S}[2, 1, 0][t] - \\
& \text{k1a RAFK}[t] \text{S}[2, 1, 0][t] + \text{d1a S}\# \text{RAFK}[2, 1, 0][t], \\
\text{S}[2, 1, 1][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 1, 1][t] + \\
& \text{kpon K}[2, 1][t] \text{S}[2, -1, 1][t] + \text{k3S}[2, 0, 1][t] + \\
& \text{kpon K}[3, 1][t] \text{S}[2, 1, -1][t] - \text{k5a S}[2, 1, 1][t] - \\
& 3 \text{kpoff S}[2, 1, 1][t] + \text{k1 S}\# \text{RAFK}[2, 1, 0][t], \\
\text{S}[2, 2, -1][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 2, -1][t] + \text{k9a S}[1, 2, -1][t] + \\
& \text{kpon K}[2, 2][t] \text{S}[2, -1, -1][t] - 2 \text{kpoff S}[2, 2, -1][t] - \\
& \text{kon K}[3, 0][t] \text{S}[2, 2, -1][t] - \text{kpon K}[3, 1][t] \text{S}[2, 2, -1][t] + \\
& \text{koff S}[2, 2, 0][t] + \text{kpoff S}[2, 2, 1][t], \\
\text{S}[2, 2, 0][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 2, 0][t] + \text{k9a S}[1, 2, 0][t] + \\
& \text{kpon K}[2, 2][t] \text{S}[2, -1, 0][t] + \text{kon K}[3, 0][t] \text{S}[2, 2, -1][t] - \\
& \text{koff S}[2, 2, 0][t] - 2 \text{kpoff S}[2, 2, 0][t] - \\
& \text{k1a RAFK}[t] \text{S}[2, 2, 0][t] + \text{d1a S}\# \text{RAFK}[2, 2, 0][t], \\
\text{S}[2, 2, 1][t] &= \text{kpon K}[1, 2][t] \text{S}[-1, 2, 1][t] + \\
& \text{k9a S}[1, 2, 1][t] + \text{kpon K}[2, 2][t] \text{S}[2, -1, 1][t] + \\
& \text{k5a S}[2, 1, 1][t] + \text{kpon K}[3, 1][t] \text{S}[2, 2, -1][t] - \\
& 3 \text{kpoff S}[2, 2, 1][t] + \text{k1 S}\# \text{RAFK}[2, 2, 0][t], \\
\text{S}\# \text{RAFK}[-1, -1, 0][t] &= \text{k1a RAFK}[t] \text{S}[-1, -1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[-1, -1, 0][t] - \text{k1 S}\# \text{RAFK}[-1, -1, 0][t], \\
\text{S}\# \text{RAFK}[-1, 0, 0][t] &= \text{k1a RAFK}[t] \text{S}[-1, 0, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[-1, 0, 0][t] - \text{k1 S}\# \text{RAFK}[-1, 0, 0][t], \\
\text{S}\# \text{RAFK}[-1, 1, 0][t] &= \text{k1a RAFK}[t] \text{S}[-1, 1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[-1, 1, 0][t] - \text{k1 S}\# \text{RAFK}[-1, 1, 0][t], \\
\text{S}\# \text{RAFK}[-1, 2, 0][t] &= \text{k1a RAFK}[t] \text{S}[-1, 2, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[-1, 2, 0][t] - \text{k1 S}\# \text{RAFK}[-1, 2, 0][t], \\
\text{S}\# \text{RAFK}[0, -1, 0][t] &= \text{k1a RAFK}[t] \text{S}[0, -1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[0, -1, 0][t] - \text{k1 S}\# \text{RAFK}[0, -1, 0][t], \\
\text{S}\# \text{RAFK}[0, 0, 0][t] &= \text{k1a RAFK}[t] \text{S}[0, 0, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[0, 0, 0][t] - \text{k1 S}\# \text{RAFK}[0, 0, 0][t], \\
\text{S}\# \text{RAFK}[0, 1, 0][t] &= \text{k1a RAFK}[t] \text{S}[0, 1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[0, 1, 0][t] - \text{k1 S}\# \text{RAFK}[0, 1, 0][t], \\
\text{S}\# \text{RAFK}[0, 2, 0][t] &= \text{k1a RAFK}[t] \text{S}[0, 2, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[0, 2, 0][t] - \text{k1 S}\# \text{RAFK}[0, 2, 0][t], \\
\text{S}\# \text{RAFK}[1, -1, 0][t] &= \text{k1a RAFK}[t] \text{S}[1, -1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[1, -1, 0][t] - \text{k1 S}\# \text{RAFK}[1, -1, 0][t], \\
\text{S}\# \text{RAFK}[1, 0, 0][t] &= \text{k1a RAFK}[t] \text{S}[1, 0, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[1, 0, 0][t] - \text{k1 S}\# \text{RAFK}[1, 0, 0][t], \\
\text{S}\# \text{RAFK}[1, 1, 0][t] &= \text{k1a RAFK}[t] \text{S}[1, 1, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[1, 1, 0][t] - \text{k1 S}\# \text{RAFK}[1, 1, 0][t], \\
\text{S}\# \text{RAFK}[1, 2, 0][t] &= \text{k1a RAFK}[t] \text{S}[1, 2, 0][t] - \\
& \text{d1a S}\# \text{RAFK}[1, 2, 0][t] - \text{k1 S}\# \text{RAFK}[1, 2, 0][t], \\
\text{S}\# \text{RAFK}[2, -1, 0][t] &= \text{k1a RAFK}[t] \text{S}[2, -1, 0][t] -
\end{aligned}$$

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d1a S#RAFK[2, -1, 0][t] - k1 S#RAFK[2, -1, 0][t],
S#RAFK[2, 0, 0][t] == k1a RAFK[t] S[2, 0, 0][t] -
d1a S#RAFK[2, 0, 0][t] - k1 S#RAFK[2, 0, 0][t],
S#RAFK[2, 1, 0][t] == k1a RAFK[t] S[2, 1, 0][t] -
d1a S#RAFK[2, 1, 0][t] - k1 S#RAFK[2, 1, 0][t],
S#RAFK[2, 2, 0][t] == k1a RAFK[t] S[2, 2, 0][t] -
d1a S#RAFK[2, 2, 0][t] - k1 S#RAFK[2, 2, 0][t],
[MAPKP, MEKP, RAFK, RAFF, K[1, 0], K[1, 1], K[1, 2],
K[2, 0], K[2, 1], K[2, 2],
K[3, 0], K[3, 1], K#K[1, 0, 2, 2],
K#K[1, 1, 2, 2], K#K[2, 0, 3, 1],
K#K[2, 1, 3, 1], K#MAPKP[1, 1],
K#MAPKP[1, 2], K#MEKP[2, 1],
K#MEKP[2, 2], K#RAFK[3, 0],
K#RAFF[3, 1], S[-1, -1, -1],
S[-1, -1, 0], S[-1, -1, 1],
S[-1, 0, -1], S[-1, 0, 0],
S[-1, 0, 1], S[-1, 1, -1],
S[-1, 1, 0], S[-1, 1, 1],
S[-1, 2, -1], S[-1, 2, 0],
S[-1, 2, 1], S[0, -1, -1],
S[0, -1, 0], S[0, -1, 1],
S[0, 0, -1], S[0, 0, 0], S[0, 0, 1],
S[0, 1, -1], S[0, 1, 0], S[0, 1, 1],
S[0, 2, -1], S[0, 2, 0], S[0, 2, 1],
S[1, -1, -1], S[1, -1, 0],
S[1, -1, 1], S[1, 0, -1],
S[1, 0, 0], S[1, 0, 1], S[1, 1, -1],
S[1, 1, 0], S[1, 1, 1], S[1, 2, -1],
S[1, 2, 0], S[1, 2, 1], S[2, -1, -1],
S[2, -1, 0], S[2, -1, 1],
S[2, 0, -1], S[2, 0, 0], S[2, 0, 1],
S[2, 1, -1], S[2, 1, 0], S[2, 1, 1],
S[2, 2, -1], S[2, 2, 0], S[2, 2, 1],
S#RAFK[-1, -1, 0], S#RAFK[-1, 0, 0],
S#RAFK[-1, 1, 0], S#RAFK[-1, 2, 0],
S#RAFK[0, -1, 0], S#RAFK[0, 0, 0],
S#RAFK[0, 1, 0], S#RAFK[0, 2, 0],
S#RAFK[1, -1, 0], S#RAFK[1, 0, 0],
S#RAFK[1, 1, 0], S#RAFK[1, 2, 0],
S#RAFK[2, -1, 0], S#RAFK[2, 0, 0],
S#RAFK[2, 1, 0], S#RAFK[2, 2, 0]]}

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